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Understanding Water-Related Multi-Hazards in a Sustainable Development Context

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Hazards do not occur in isolation and for this reason a multi-hazard approach is vital in realising their impact and providing solutions for disaster risk reduction and sustainable development. This research provides a bibliometric analysis of the multi-hazard literature, a critical analysis of the existing approaches and proposes a framework for investigating water-related multi-hazards. It was found that multi-hazard research has expanded greatly over the last 20 years furthering our understanding of the subject with important applications in risk assessment and management. These studies have contextualized multi-hazards, developed models and frameworks to analyse them, provided case studies to test multi-hazard based approaches, and latterly offered reviews. An important finding was that there is less multi-hazard research in lower income countries and remote environments due to data scarcity and limited accessibility. The critical analysis also found that existing approaches tend to focus on individual hazards, the interaction between one hazard and another, or upon linear hazard chains. Consequently, this research proposes a new multi-hazard framework for investigating water-related multi-hazards that has the potential to synthesise existing methods and overcome the challenges identified. This novel framework is dynamic and sufficiently flexible to address geographically specific key considerations including available and accessible data, community variability and cross-sectoral collaborations. The research concludes that the framework offers an improved understanding of multi-hazards, disaster risk reduction, increased community resilience and progress in sustainable development. Future work will assess the ability of the framework to capture the reality of multi-hazard environments in a comprehensive manner through pilot studies comparing remote and data scarce regions of low-income countries. Data generated from these investigations will be used in a wider geographic context to assess natural and anthropogenic drivers of multi-hazards and yield spatial and temporal projections of multi-hazard vulnerability.